CONTENTS

Platelet activating factor: chemical and biochemical characteristics
DONALD J. HANAHAN and RAJ KUMAR 1

Animal glycoglycerolipids
BRONISLAW L. SLOMIANY, VARAHABHOTLA L. N. MURTY, YUN H. LIAU and AMALIA SLOMIANY 29

Lipid metabolism in fish
DIANA H. S. GREENE and DANIEL P. SELIVONCHICK 53

Fatty acid metabolism of isolated mammalian cells
MIRIAM D. ROSENTHAL 87

The role of phospholipid-derived mediators including arachidonic acid, its metabolites, and inositoltrisphosphate and of intracellular Ca^{2+} in glucose-induced insulin secretion by pancreatic islets
JOHN TURK, BRYAN A. WOLF and MICHAEL L. MCDANIEL 125

Metabolism of arachidonic acid and other polyunsaturated fatty acids by blood vessels
WILLIAM S. POWELL and COLIN D. FUNK 183

Lung surfactant
J. L. HARWOOD 211

Recent advances in capillary gas chromatography applied to lipid analysis
H. TRAITLER 257

The lipid composition and biochemistry of freshwater fish
R. JAMES HENDERSON and DOUGLAS R. TOCHER 281

SUBJECT INDEX

1-*O*-Alkyl-2-acetyl-*sn*-glycero-3-phosphocholine (AGEPC) *see also* platelet activating factor
  derivatized, analysis 23
  fragmentation pattern 24
Aorta, polyunsaturated fatty acid metabolites 205, 206
Arachidonic acid
  accumulation, glucose induced 161–163
  calcium mobilization 159–161
  cell culture synthesis 99, 100
  metabolism
    fatty acids 118
    insulin secretion 149, 158, 159
    islet 149
    lipoxygenase 145
    vasculature 183–207
  metabolite identification 187–189
  release, cell culture 111
Autoxidation mechanisms 315

Blood vessels
  arachidonic acid metabolism 183–207
    hydroperoxide effects 192–194
    indomethacin effects 190
    modulation 190–192
    scheme 187
  polyunsaturated fatty acids and metabolite release 203–207

Calcium
  endoplasmic reticulum regulation 166–168
  homeostasis, endoplasmic reticulum 168, 169
  role in insulin secretion 130–134
Cells, fatty acid metabolism in isolated 87–119
Choline phosphotransferases, lung tissue 224–226
Chromatography, capillary gas
  carrier gas 261
  column material 260, 261
  detectors 263
  glass surface etching 257–259
  injection techniques 262, 263
  lipid analysis 257–277
  lipid class analysis 264–269
  -mass spectrometry 263, 264
  prostanoid analysis 273–277
  triglyceride analysis 269–273
Chromatography, platelet activating factor
  column 19, 20
  high performance liquid 20, 21
  thin layer 18, 19
Chromatography, polyunsaturated fatty acids
  gas-mass spectrometry 186, 187
  reverse phase-HPLC 185, 186
Cyclooxygenase pathway
  cell culture 115, 116
  products and insulin secretion 143, 144
  regulation 177
Cytochrome p450 monooxygenases, products and insulin secretion 147, 148
Cytoskeleton and insulin secretion 136, 137

Desaturation
  fatty acid metabolism in cell culture 102–105
  pathways, fish 304
Diacylglycerol
  insulin secretion effects 163–166
    role 165, 166
  islet accumulation 165
  protein kinase C effects 163
Dipalmitoyl phosphatidylcholine formation 226–228
Ductus arteriosus, polyunsaturated fatty acid metabolites 207

5,8,11,14,17-Eicosapentaenoic acid, aorta metabolism 194–197
8,11,14-Eicosatrienoic acid, aorta metabolism 197, 198
Elongation
  fatty acid metabolism in cell culture 105–108
  pathways, fish 304
Endoplasmic reticulum, calcium homeostasis 169
Enzyme activity, temperature in fish 73–75

Fatty acids
  capillary gas chromatography 264, 265
  desaturation in fish 78–80, 303–306
  elongation in fish 78–80, 303–306
  exogenous, cell uptake 88–97
  methyl esters, gas chromatography 265–268
  release, cell culture 109–114
    agonist-stimulated 110, 111
    endothelial cells 113, 114
    platelet studies 111–113
  unusual, cell incorporation 94
Fatty acids, essential
  autoxidation 314, 315
  cell culture requirement 97–99
  deficiency
    cell culture 100, 101
    fish 313
  eicosanoid metabolism 316, 318
  freshwater fish 312–318
  protective mechanisms 315, 316
  requirements 313, 314
  roles, freshwater fish 316–318
Fatty acids, fish 291–298
  cholesterol synthesis 306, 307
  cholesteryl esters 295
  esterification pathways 301–307
  glycerogenesis 302, 303
  lipid synthesis 299–301
    tissue 300, 301
  polar lipids 296–298
  reduction 306
  total lipid 292–294
  triacylglycerides 294, 295
  wax esters 295

Fatty acids, fish lipid metabolism 59–69
  nutritional requirements 60, 61
  n–3 requirement 59, 60
  tissue lipids 62, 63
Fatty acid metabolism
  acyl group sources 91, 92
    accumulation 95
  desaturation effects 102–105
  elongation effects 105–108
  incorporation pathways 89–91
  isolated mammalian cells 87–119
  retroconversion 108
Fatty acid oxidation
  freshwater fish 321–324
  mitochondrial 322, 323
  peroxisomal 323, 324
Fatty acid, ω3 polyunsaturated
  cell culture 101
  oxygenated metabolite extraction 184–187
Fatty acid synthesis, cell culture 114–119
Fish
  anadromous 335–339
    fatty acids 337–339
    life cycle 335, 336
    lipid content 336, 337
  embryonic development 324
  gonad maturation 319
  lipid composition, freshwater 281–340
  lipid metabolism 53–84
  lipid mobilization 318–321

Galactoglycerolipids
  biosynthesis 37, 38
  disease 45
  fatty acid composition 32, 33
  function 41–43
  subcellular distribution 34
  tissue content 31
Ghee, triglyceride composition 270
Glucoglycerolipids 34–37
  biosynthesis 38–40
  in disease 45, 46
  mucosal protection 44, 45
  salivary defence 43, 44
  tissue composition 34–36
Glycoglycerolipids, animal 29–48
  biosynthesis 37–40
  composition 29–31
  degradation 40, 41
  in disease 45–47
  functions 41–45

12-Hydroxyeicosatetraenoic acid (12-HETE)
  and insulin secretion 148

Inositol phosphates, accumulation in Islets 154–157
Inositol 1,4,5-triphosphate
  calcium mobilization 150, 151
  insulin secretion
    role 157, 158
    tumour effects 151–153
  islets, mass measurements 156
Insulin secretagogues 128–130
Insulin secretion
  arachidonate metabolites 143–149
  arachidonic acid accumulation 162, 163
  arachidonic acid mediation 158–163
  calcium role 130–134
  glucose-induced, event scheme 169–171
  islet, mediators affecting 125–172
  mechanisms 137
  metabolic consequences 128
  models 130
  phospholipid-derived mediators 138–166
  protein kinase role 134–136
  time course 129
Insulin storage 136
Islets of Langerhans
  cellular composition 127, 128
  glycerolipid composition 140
  inositol phosphates 155
  phospholipid secretagogues 140–142
  signal transduction 166–172

Linoleic acid, aorta metabolism 199–203
  scheme 200
Lipase
  fish lipid metabolism 54–56
  hormone sensitive 320
Lipid catabolism
  fatty acid oxidation 321–324
  fish development 325, 326
  freshwater fish 318–324
  mobilization 318
Lipid metabolism in fish 53–84
  biotin role 64, 65
  enzymes 54–59
  fatty acid effects 59–69
  lipid excess 62
  natural habitat 68, 69
  protein effects 61, 62
  vitamin E 69–72
Lipids in fish
  absorption 309, 310
  adipose tissue 289
  blood 291
  brains 289
  development 324–326
  dietary, metabolism 307–312
  diet effects 327–329
  digestion 307–309
  eggs 324, 325
  fatty acid composition 285–287, 291–298
    carbon source 299
  freshwater 281–340
  gills 289, 290
  gonads 290, 291
  liver 288, 289
  muscle 284, 287, 288
  neutral and temperature 75
  salinity 334, 335
  species 65–68
    content and fatty acids 285–287
  temperature effects 72–80, 329–334
  tissue, mobilization 63, 64
  transport, plasma 310, 311
Lipid synthesis and temperature in freshwater fish 332–334
Lipid turnover, cell culture 109–114
Lipogenic enzymes in fish 57
Lipoxygenase pathway
  cell culture 115, 116
  products and insulin secretion 144–147
  regulation 117, 118
Lung surfactant 211–247
  components 212–220
    functions 217–220
  diseases affecting 244–246
  immunosuppression 220
  lipid composition 213

lipid synthesis 220–230
and lung development 232–235
lymphocyte interaction 219, 220
macrophage interactions 218, 219
medical implications 238–246
phosphosglyceride/phosphoinositol ratio 234
phospholipids 213–216
proteins 216, 217
functions 218
secretion 237, 238
storage 235, 236
surface activity 217, 218
turnover 238

Mass spectrometry
capillary gas chromatography 263, 264
platelet activating factor 21–27
Membrane permeability and temperature in fish 72, 73

Palm oil, triglyceride separation 272
Phosphatidate metabolism, lung surfactant 221–224
Phosphatidate phosphohydrolase 223, 224
Phosphatidylcholine metabolism
control 231, 232
hormones affecting 231
lung surfactant 224–228
Phosphoglycerides
acidic, lung synthesis 228–230
synthesis control 232
Phosphoinositide metabolism 150
Phospholipase inhibitors, insulin secretion 142, 143
Phospholipids
fatty acid incorporation 92–94
freshwater fish 296–298
hydrolysis mechanisms 141
metabolism and insulin secretagogues 138–143
and temperature in fish 76–78
Platelet activating factor 1–27
behaviour
biochemical 14–17
biological 12–14
bovine erythrocytes, scheme 6, 7
fragmentation patterns, mass spectrometry 24–27
isolation techniques 17–27
lipid mediator 3
origin of term 2
protein phosphorylation 15–17
rat fish liver oil 5, 6
synthesis 4–12
analogue 14
asymmetric 11
enzymatic 10, 11
semisynthetic scheme 4–7
stereoselective 7, 9, 10
total, pathway 7–12
synthetic analogues 8
Prostacyclin
atherosclerosis 184
biological effects 183, 184
Prostaglandin synthesis in fish 80–82
Prostanoid analysis
capillary gas chromatography 273–277
mass chromatogram 276
standards 275
Protein kinase
C in Islets 164, 165
role in insulin secretion 134–136

Quartz, rat lung activity 243, 244

Respiratory distress syndrome
adult 242
mineral exposure 242–244
newborn, lung surfactant 239
prediction 240
surfactant replacements 241
treatment effects 240

Salinity, freshwater fish lipids 334, 335
Selenium deficiency, polyunsaturated fatty acid metabolism 206
Signal transduction
electrophysiological processes 171, 172
islets 166–172
scheme 164
Stimulus–secretion coupling 148

Temperature
fatty acids 330, 331
freshwater fish lipids 329–334
lipid classes 330
lipid composition in fish 72–80
lipid synthesis 332–334
Triacylglycerols
biosynthesis in fish 56, 57
cells synthesizing 96, 97
Triglycerides
capillary gas chromatography 269–273
mono- and diglyceride analysis 273
positional isomers 271

Vitamin E
lipid metabolism in fish 69–72
lipid peroxidation in fish 315